COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY (CLEAN II)
Northern and Central California, Nevada, and Utah
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Contract Task Order No. 5

Prepared for

Tetra Tech EM Inc.
135 Main Street, Suite 1800
San Francisco, CA 94105

SCREENING SURVEY FOR RADIATION AT REGUNNING PIER
HUNTERS POINT NAVAL SHIPYARD, SAN FRANCISCO, CALIFORNIA

July 12, 2001

Prepared By

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Screening Survey for Radiation at Regunning Pier

Introduction

A Navy map was discovered at the former Hunters Point Naval Shipyard (HPSY) showing an area of the regunning pier labeled "NRDL barge." The area is located east of the very large crane on the pier (see Figure 1.) NRDL refers to the Naval Radiological Defense Laboratory. Due to the history of NRDL activities at HPSY, radioactive materials may have been used in this area.

A second area, directly under the crane, is labeled, "Concrete Test Pad." This pad is still in place. Its function appears to be related to the crane, although it was suggested that radiological tests might have been performed on the pad.

On June 15 and July 7, 2001, screening measurements were made in and around these areas to determine if any elevated radiation levels were present. This short report provides the results of those measurements.

Methods

Two types of measurements were made. First, ambient gamma ray levels were measured using a portable radiation detector. Secondly, measurements were made of surface radioactivity at selected locations. These measurements were made with a detector sensitive to alpha and beta radiations.

Instruments

Ambient gamma radiation was measured using a 2-inch by 2-inch sodium iodide (NaI) gamma scintillation detector system (Ludlum Instruments Model 2350-1 ratemeter/scaler coupled to a Ludlum Instruments Model 44-10 detector). This radiation detection system measures gamma rays with energies in the range of about 80 to 3,000 kilo electron volts (keV). This energy range includes gamma rays emitted by radium-226, cesium-137 and a large number of other radionuclides. The detector was calibrated on 8/21/00 (within a year of the survey date). The instrument calibration was checked daily, using a small radium source. Attachment 1 contains copies of detector and calibration information.

The second instrument is a Geiger-Mueller detector (Ludlum Model 44-9). This consists of a 2 1/2" diameter detector designed to lay flat on surfaces. The detector was calibrated in July 2000, and recalibrated immediately after this survey. The recalibration certificate is shown in Attachment 1. The instrument calibration was checked daily, using a small radium source.

Results

The east survey area is shown in Figure 1. Ambient gamma levels for this area are plotted in Figure 2. Levels have been correlated to surface materials, as suggested by the figure. Dark blue colored asphalt exhibited the highest gamma ray levels, and light blue colored asphalt the lowest. Unpaved and concreted areas exhibited intermediate gamma ray levels. Levels have been averaged over surface material. These averages are given in Table 1.

These variations are not unusual, since background gamma ray levels are variable, and depend on the surface materials present, among other factors[1]. Raw data are given in Table 2 and Figure 3.

Finally, the geiger-counter measurements made over drains, surface cracks, and other unusual features, all showed background levels. Results are given in Attachment 2.

Conclusions

Measurements made during this screening indicate that only background levels of radiation are present on the areas of the regunning pier that were surveyed. No unusual radiological conditions were detected during this work.

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[1] See *Screening Survey for Radiation at IR-02 Storage Shed*, May 8, 2001.

Table 1.
Summary of 1-min Gamma Counts

Surface Material	Ave. CPM
Asphalt:	
- Light blue	2450
- Dark blue	4133
Concrete	3120
Dirt/gravel	3596

Notes:
Measurements taken 1m above grade.
CPM = gamma counts per minute.

Table 2.
Results of 1-min Gamma Counts (from July 7, 2001)

Dist. North (ft.)	Dist. East (ft.)	CPM	Dist. North (ft.)	Dist. East (ft.)	CPM
0	0	3582	20	60	4769
20	0	2271	0	60	3718
40	0	2259	0	80	4315
60	0	2204	20	80	4378
60	20	2325	40	80	4361
40	20	3660	60	80	2587
20	20	4236	60	100	2487
0	20	3403	40	100	4283
0	40	3173	20	100	4454
20	40	4323	0	100	4119
40	40	4044	0	115	3536
60	40	2241	20	120	3890
60	60	3055	40	120	3954
40	60	4087	60	120	2624

Notes:
Measurements taken 1m above grade. CPM = gamma counts per minute.
Reference point is southwest corner of area.

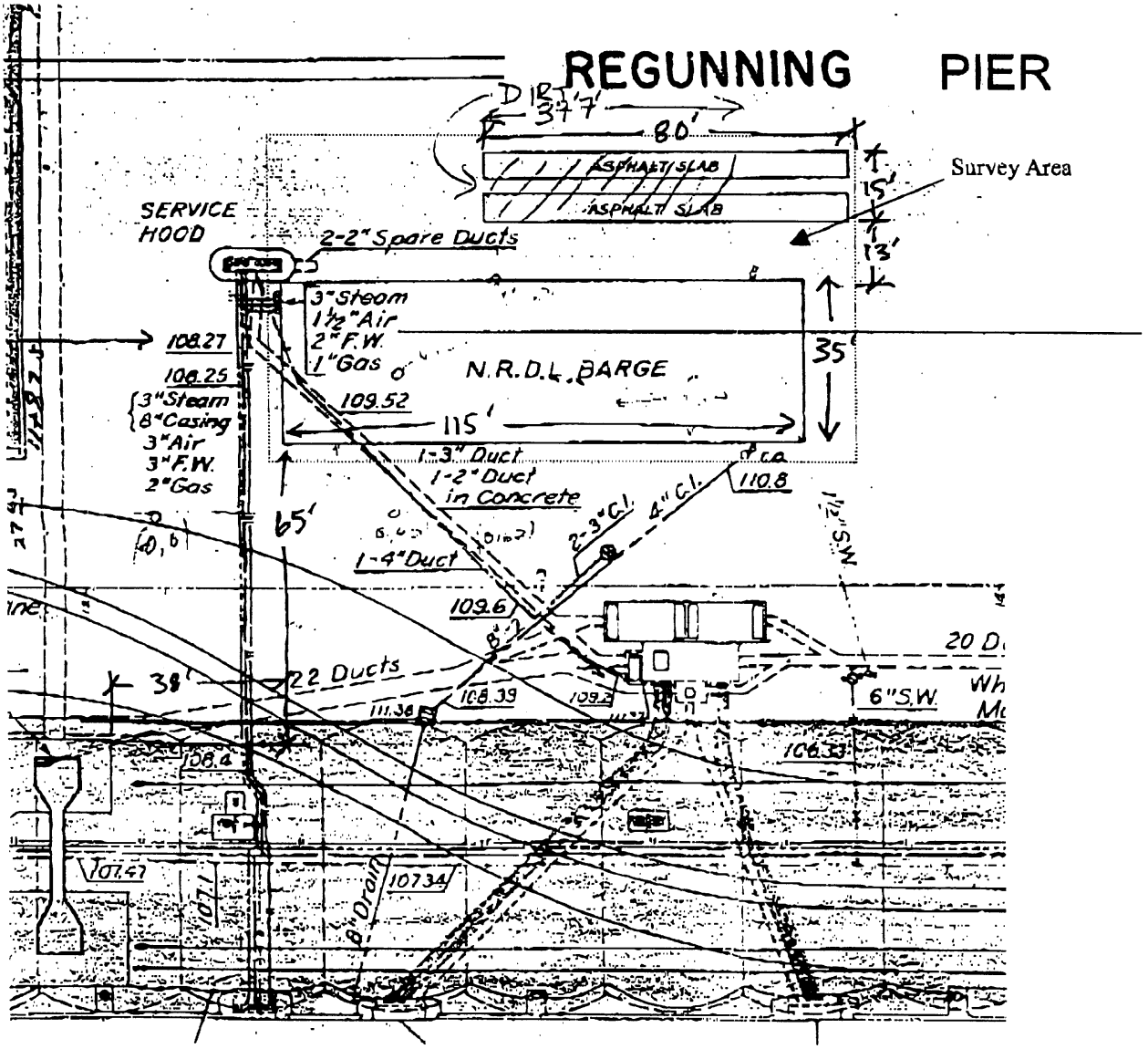


Figure 1. Regunning Pier Area - East of Overhead Crane (historical details)

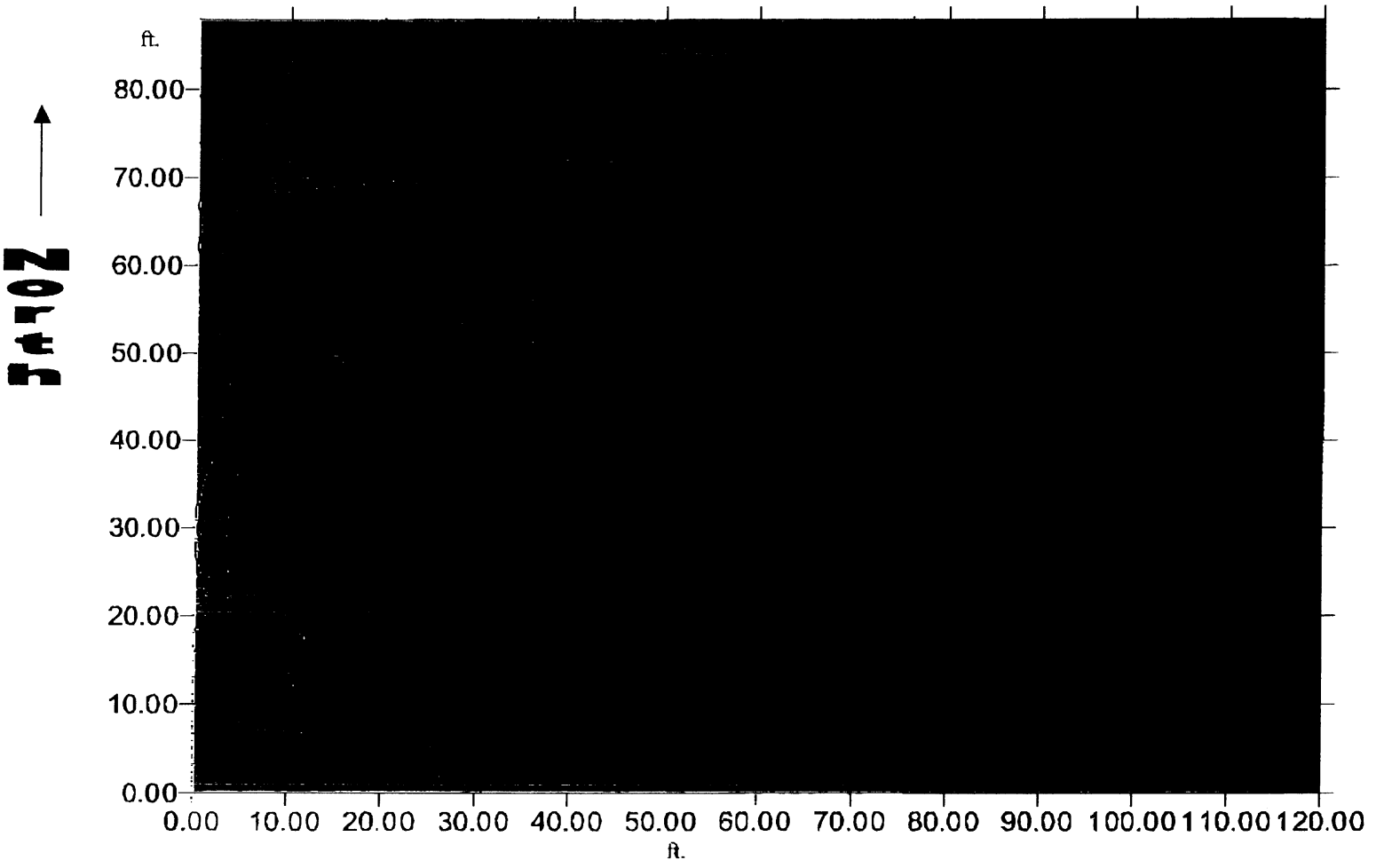
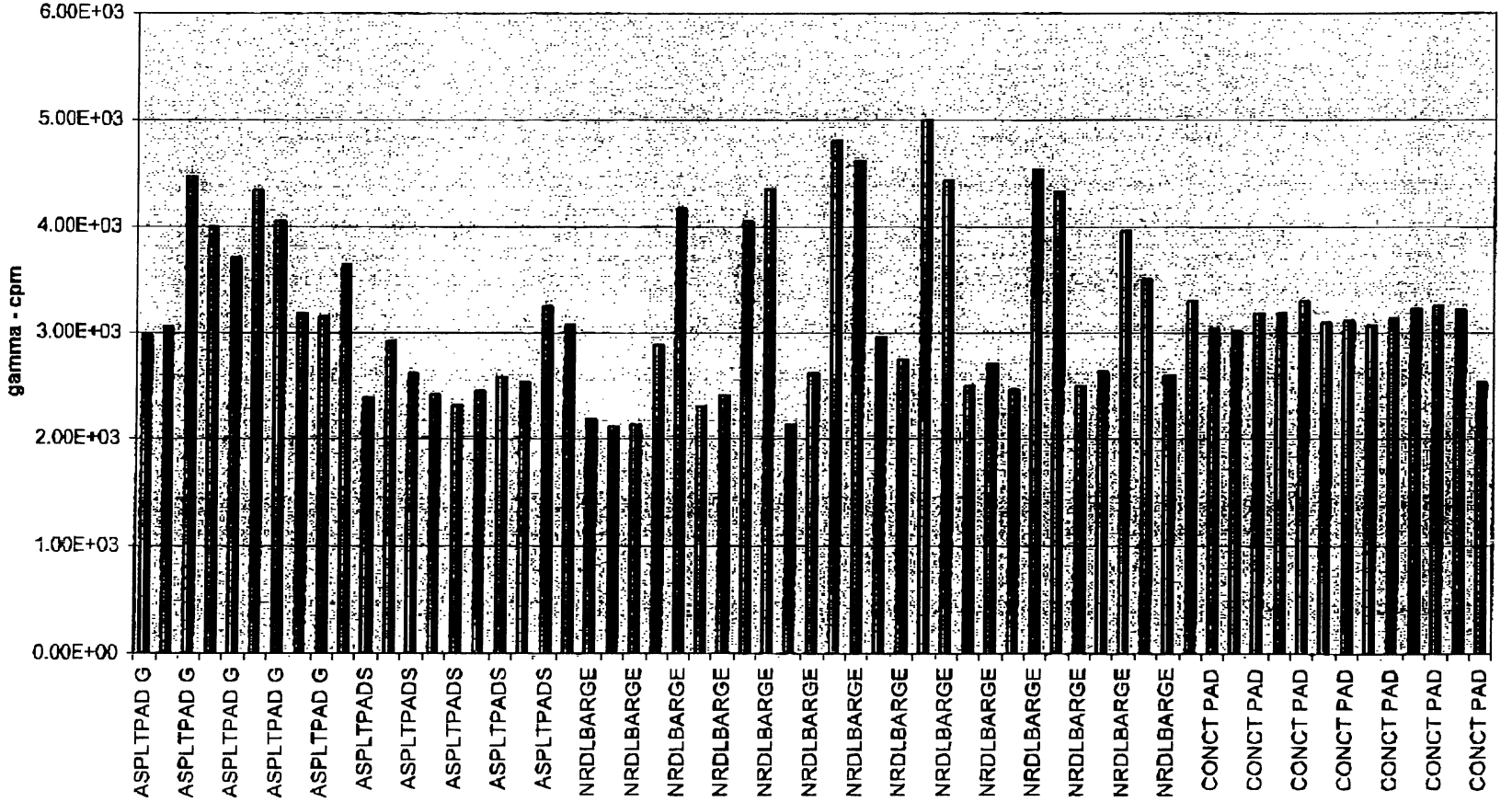


Figure 2. Gamma Radiation Levels Contour Map of Survey Area (units = c.p.m.)

FIGURE 3. Regunning Pier Area
06/15/01, 60-sec Readings



Note: ASPLTPAD G = grass area, formerly asphalt pad. CONCT = concrete.

ATTACHMENT 1

DETECTOR INFORMATION

Field Source Check/Control Log

CTO: _____ Site: HPSY Surveyor: JTC Employee No.: _____ Employer: _____

Calibration No.: _____ Instrument Designator: D3 (137Cs Setup) & D4

Instrument SN: 98612 Instrument Type: ~~[illegible]~~ Inst. Model: 2350-1 Last Calibration Date: 31 Aug 00 Cal. By: Ludlum Cal. Due: 8/31/01

Detector SN: 135848 Detector Type: n/a Detector Model: 44-10 Last Calibration Date: " Cal By: " Cal Due: "

A Check Source Type: A1 Source No.: — Serial No.: — Activity (DPM): R Geo: circle Background: _____ Background Location: _____ Nominal Response: _____

B Check Source Type: _____ Source No.: _____ Serial No.: _____ Activity (DPM): _____ Geo: _____ Background: _____ Background Location: _____ Nominal Response: _____

Set-Up Notes: SCA window set for 137Cs peak. LMI 44-10 ref on Ra check source.

Source Measurement				Control		Check if OK						
Date / Time	Source	Response (cpm)	Background (cpm)	UCL (3 σ) (cpm)	LCL (3 σ) (cpm)	Cable	~~HV~~ DAT	~~Batt~~ HV	Speaker	Display	Notes	OK by
02/15/01 5:00	A	144	31	140	90	✓	5.8v	600	✓	✓	WINDOW (SCA) ON	
02/15/01 17:00	A	132	31	140	90	✓	5.6v	579	✓	✓	Net = 101 cpm	
						~~✓~~	~~5.6~~	~~579~~	✓	✓		
03/15/01 11:00	A	162	49	140	90	✓	5.6	549	✓	✓	Net = 109 cpm	
03/15/01 11:30	A	12121	5130	7237	6643	✓	5.5	599	✓	✓	Net = 6991 WINDOW OFF (D4)	
03/19/01 10:30	A	9683	2831	7237	6643	✓	5.6	599	✓	✓	Net = 6852	
05/30/01 22:00	A	11,771	4955	7237	6643	✓	5.4	599	✓	✓	Net = 6816	
5/30/01 22:05	A(D4)	114	50	140 gross	90 gross	✓	5.4	599	✓	✓	~~Gross~~ Net = 114	
7/5/01 08:30	A/D4	8964	2144	7237	6643	✓	5.9	599	✓	✓	Net = 6802	

Completed By: _____ Sign _____ Date _____

Reviewed By: _____ Sign _____ Date _____

Validation _____

Document in Microsoft Exchange

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER APPLIED SCIENCES COMPANY ORDER NO. 251675/249789

Mfg. Ludlum Measurements, Inc. Model 2350-1 Serial No. 98622

Cal. Date 21-Aug-00 Cal Due Date 21-Aug-01 Cal. Interval 1 Year Meterface n/a

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 71 °F RH 38 % Alt 703.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair ☐ Other-See comments

☑ Mechanical check ☑ Input Sens. Linearity

☑ F/S Resp. check ☑ Reset check ☑ Window Operation

☑ Audio check ☑ Alarm Setting check ☑ Battery check (Min. Volt) 4.4 VDC

☑ Ratemeter Linearity check ☑ Integrated Dose check ☑ Recycle Mode check

☑ Data Log check ☑ Overload check ☑ Scaler Readout check Threshold Dial Ratio 100 = 10 mV

☑ Calibrated in accordance with LMI SOP 14.8 rev 12/05/89. ☑ Calibrated in accordance with LMI SOP 14.9 rev 12/19/89.

☑ HV Readout (2 points) Ref./Inst. 497 / 500 V Ref./Inst. 2001 / 2000 V

COMMENTS: Firmware: 37122N21

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I/O firmware version 37123N04
Resolution for Cs137 11.6% using setup #3
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Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.

	Probe Model	Serial #	High Voltage	Threshold	Units/ Time Base	Dead Time Correction Factor	Calibration Constant	Linearity ±10%*
Detector # 1	LMI43-68A	PR140511	1250	50	7 / 1	1.816030E-05	1.000000E+00	
Detector # 2	LMI43-68B	PR140511	1750	50	7 / 1	2.133988E-05	1.000000E+00	
Detector # 3	CS137 PK	PR135848	588	842	7 / 1	0.000000E+00	1.000000E+00	
Detector # 4	80KEV CPM	PR135848	588	80	7 / 1	1.677247E-05	1.000000E+00	
Detector # 5	80KEV R/H	PR135848	588	80	4 / 2	1.677247E-05	4.909458E+10	✓
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								

Units: 0 – rad, 1 – Grey, 2 – rem, 3 – Sv, 4 – R, 5 – C/Kg, 6 – Disintegrations, 7 – Counts, 8 – Cstm sq., 9 – Bqlm sq.
Time Base: 0 – Seconds, 1 – Minutes, 2 – Hours

* See attached detector documentation, if applicable.

	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
Digital Readout	400 K cpm	410291 (0)	410283 (0)	100 cpm	40 (0)	40 (0)
	40 K cpm	4024	4024	40 cpm	4	4
	4 K cpm	400	400			

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. The calibration system conforms to the requirements of ANSI/NCSL Z540-1-1994 and ANSI N323-1978. State of Texas Calibration License No. LO-1963

Reference Instruments and/or Sources: Cs-137 Gamma S/N

☐ 1162 ☐ C112 ☑ M565 ☐ S105 ☐ T1008 ☐ T879 ☐ E552 ☐ E551 ☐ Neutron Am-241 Be S/N T-304

☑ Alpha S/N Pu239 #8749 ☑ Beta S/N Tc99 #NI-EV ☑ Other Cs137-1uCi

☑ m 500 S/N 70648 ☑ Multimeter S/N 61730074

Calibrated By: [signature] Date 21-Aug-00

Reviewed By: [signature] Date 21 Aug 00

RADIATION DETECTION COMPANY
8095 Camino Arroyo P.O. Box 22300 Gilroy, CA 95020-2230
Ph: (408)842-2700 Fax: (408)847-2988 www.radetco.com

NVLAP*

CALIBRATION OF SURVEY INSTRUMENT

Report No: 03

Applied Sciences Co.
Attn: Joel Cehn
1036 Hubert Road
Oakland, CA 94610

Purchase Order #:
Account #: 12534-00
Calibration Date: July 11, 2001

Instrument: Bicron Model #: Surveyor M Serial #: A315X
Probe: 44-9 Probe Serial #: 010357

Exposure Ppm	Instrument Reading cpm	Instrument Scale
800,000	830,000	X1000
500,000	512,000	X1000
200,000	210,000	X1000
80,000	82,000	X100
50,000	51,000	X100
20,000	20,000	X100
8,000	8,200	X10
5,000	5,100	X10
2,000	2,000	X10
800	810	X1
500	500	X1
200	200	X1

Notes: Calibrated to a pulse generator traceable to NIST in accordance with MIL-STD-45662A
Response to: Isotope: ^{137}Cs Activity: 1 mR/h
Instrument Response: 4,000 cpm For Probe: 44-9
Temperature: 68° F, Humidity: 46%, Barometer: 758 mm.

A complete record of each instrument calibration is maintained in our files. Battery checks and routine preventive maintenance are also included as a part of the calibration procedure. The Calibration Due date is only a suggestion. The actual frequency of re-calibration may vary depending on regulatory requirements.

Next Calibration Due: July 2002 Calibrated by: Fred Lopez

IL
Calib\12534-00.03
07/11/01

ATTACHMENT 2

SURVEY SHEETS FOR SURFACE MEASURMENTS

RADIOLOGICAL SURVEY REPORT

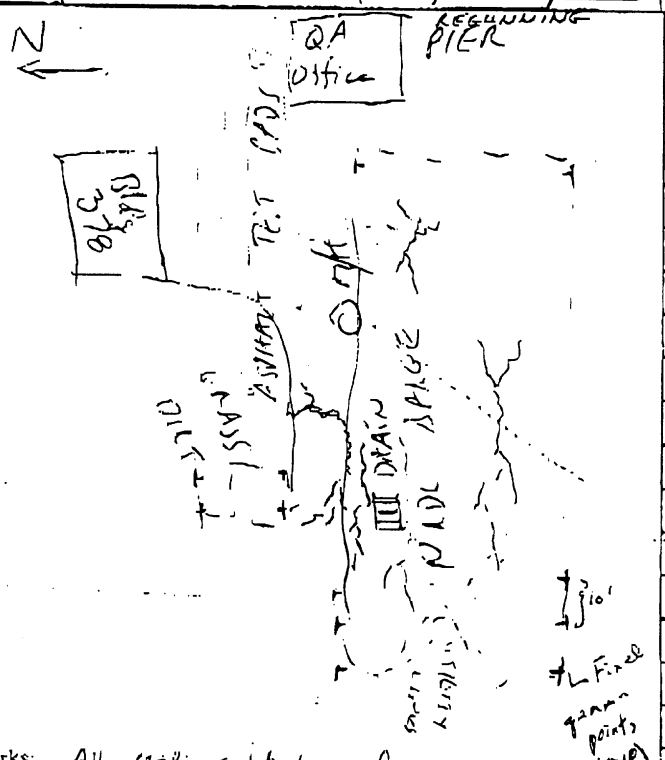
ATGS #: _____

DATE: 6/15/01	INSTRUMENTATION USED				
TIME: 10:30	MODEL	S/N	EFF.%	BKRD	CAL. DUE DATE
SURVEYOR: JTC	M	A315X			
LOCATION: HPS	44-9	10357	~10%	3D-100	9/25/01
REVIEWED BY:					
Smear Locations Circled; Dose	Rates=	mR/hr			

PURPOSE OF SURVEY: Beta/gamma survey of drains and cracks in floor locations in conjunction with gamma (NaI) survey of area

SMEAR RESULTS
RESULTS = DPM/100cm²
UNLESS NOTED

#	βγ	α



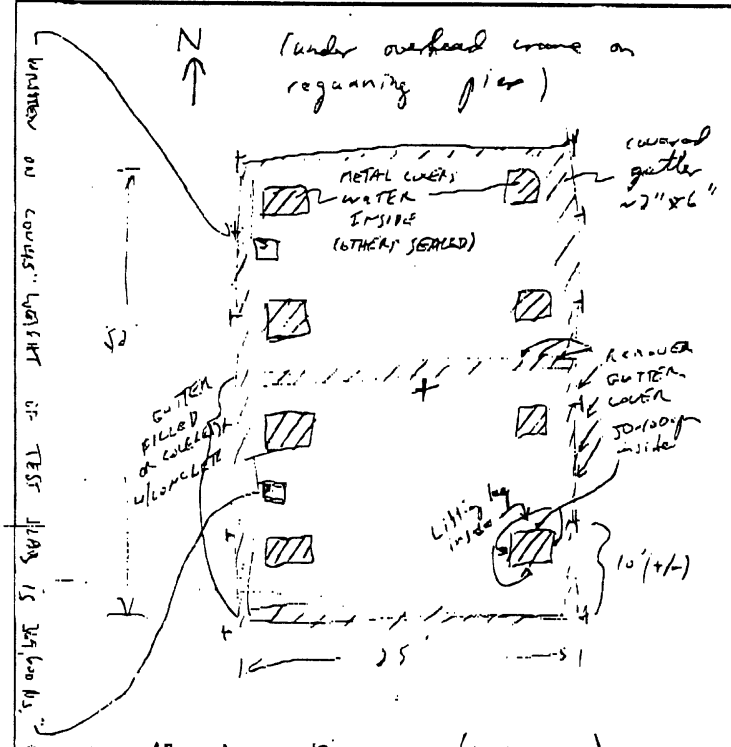
Remarks: All readings at background

RADIOLOGICAL SURVEY REPORT

ATGS #: _____

DATE: 6/15/01	INSTRUMENTATION USED				
TIME: 13:30	MODEL	S/N	EFF.%	BKRD	CAL. DUE DATE
SURVEYOR: JLC	M	A315X			
LOCATION: [illegible]	44-9	10357	~10%	50-100	5/25/01
REVIEWED BY:					
Smear Locations Circled; Dose Rates= mR/hr					

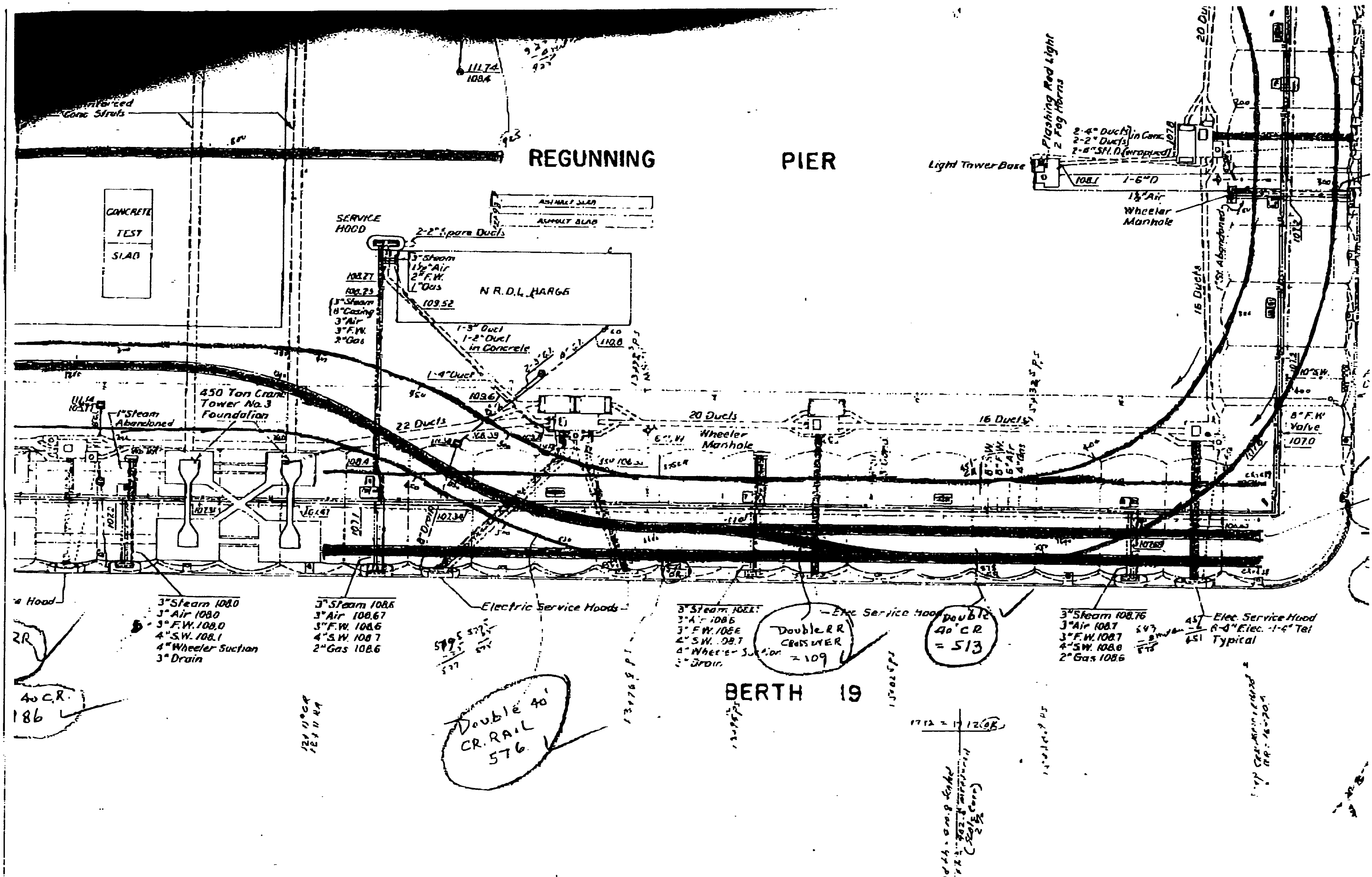
PURPOSE OF SURVEY: Beta survey of "concrete test pad" AS requiring pier.



Remarks: all readings 50-100 cpm (background)

SMEAR RESULTS
RESULTS = DPM/100cm²
UNLESS NOTED

#	βγ	α


REGUNNING PIER
BERTH 19
CONCRETE TEST SLAB
SERVICE HOOD
2-2" Spare Ducts
3" Steam
1½" Air
2" F.W.
1" Gas
N.R.D.L. HARGE
ASPHALT SLAB
1-3" Duct
1-2" Duct
in Concrete
1-4" Duct
22 Ducts
20 Ducts
16 Ducts
Wheeler Manhole
450 Ton Crane Tower No. 3 Foundation
1" Steam Abandoned
Light Tower Base
Flashing Red Light
2 Fog Horns
2-4" Ducts
2-2" Ducts
in Conc.
1-6"D
1½" Air
Wheeler Manhole
8" F.W. Valve
107.0
10" S.W.
3" Steam 108.0
3" Air 108.0
3" F.W. 108.0
4" S.W. 108.1
4" Wheeler Suction
3" Drain
3" Steam 108.6
3" Air 108.67
3" F.W. 108.6
4" S.W. 108.7
2" Gas 108.6
Electric Service Hoods
3" Steam 108.76
3" Air 108.7
3" F.W. 108.7
4" S.W. 108.8
2" Gas 108.6
Elec. Service Hood
Typical
Double 40' CR. RAIL 576
Double RR Crossover = 109
Double 40' CR = 513
40 C.R. 186